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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/520,633

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Yuji Takakuwa

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EXAMINER

BURKHART, ELIZABETH A

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

11/19/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/520,633	Applicant(s) TAKAKUWA, YUJI	
	Examiner ELIZABETH A. BURKHART	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/10/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 7/10/2002. It is noted, however, that applicant has not filed a certified copy of the 2002-201148 application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. Claims 1, 2, 7-11, 16, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki ('610) in view of Inayoshi (JP 02-182883).

Yamazaki teaches a surface treating method wherein a substrate is placed in a process chamber, pressure is maintained between 0.001-1 atm, ultraviolet light is irradiated from a light source housed in the process chamber having a light output window (quartz), and a process gas is supplied into the process chamber to treat the

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surface of the substrate. The UV light is generated using a low pressure mercury lamp. The process gas comprises silane or polysilanes and ammonia or hydrazine for forming a SiN film on the substrate (Abstract, Fig. 1, Col. 2-Col. 3).

Yamazaki does not teach applying a negative bias voltage to the substrate.

Inayoshi teaches forming a SiN film by ultraviolet excitation using low pressure mercury lamps, wherein a mesh electrode is used to apply a negative bias to the substrate to prevent cloudiness of the quartz window. The bias voltage is applied between the mesh electrode and the substrate (Abstract, Fig. 2).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to use a mesh electrode to apply a negative bias voltage as suggested by Inayoshi to the substrate of Yamazaki in order to prevent deposition on the quartz window and enhance operation efficiency.

Regarding Claim 1, the specification discloses that ultraviolet in the 3-10 eV energy region can be generated by low-pressure mercury lamps (p. 2, par. 5), thus the low pressure mercury lamp of Yamazaki would inherently produce UV having a photon energy within the claimed range.

Thus, claims 1, 2, 7-11, 16, and 20 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Yamazaki and Nakamura.

3. Claims 3, 12, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki ('610) in view of Inayoshi (JP 02-182883) as applied above and further in view of Ray et al.

Yamazaki and Inayoshi do not disclose that the process gas contains carbon and hydrogen and a diamond-like carbon film is formed.

Ray teaches that diamond like carbon (DLC) films may be formed on a substrate by photochemical vapor deposition wherein low pressure mercury lamps are used to irradiate a process gas containing carbon and hydrogen (Abstract, p. L1559).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the photochemical vapor deposition process of Yamazaki by using a process gas containing carbon and hydrogen as suggested by Ray in order to form a DLC film on the substrate.

Thus, claims 3, 12, and 17 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Yamazaki, Inayoshi, and Ray.

4. Claims 4, 5, 13, 14, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki ('610) in view of Inayoshi (JP 02-182883) as applied above and further in view of Horioka et al ('601).

Yamazaki and Inayoshi do not disclose that the process gas contains a component reactive with the substrate material and a film (oxide, nitride, or carbonized) resulting from that reaction is formed on the substrate.

Horioka teaches a method of forming an oxide or nitride film on a silicon substrate, the method comprising: introducing a process gas containing oxygen or a nitrogen-containing gas to the chamber, and irradiating said process gas using a mercury lamp such that the oxygen or nitrogen reacts with the silicon substrate to form silicon oxide or silicon nitride (Col. 3, lines 17-55, Fig. 1).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to form the SiN film of Yamazaki by reacting the nitrogen-containing gas with the substrate as suggested by Horioka as a suitable alternative to using a silicon-containing process gas, especially since both Yamazaki and Horioka disclose silicon substrates, ammonia or hydrazine as the nitrogen-containing gas, and irradiating the process gas with mercury lamps.

Thus, claims 4, 5, 13, 14, 18, and 19 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Yamazaki, Inayoshi, and Horioka.

5. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki ('610) in view of Inayoshi (JP 02-182883) as applied above and further in view of Aoyama (JP 04-146620).

Yamazaki and Inayoshi do not disclose that the process gas contains a non-reactive component and the collision of said component results in the flattening of the substrate surface.

Aoyama teaches flattening the surface of a semiconductor substrate by exposing said substrate to a process gas containing a non-reactive component and irradiating said process gas using a mercury lamp (Abstract, Fig. 1).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the process of Yamazaki by incorporating the process gas of Aoyama in order to flatten the semiconductor substrate surface such that a

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smoother film may be deposited, especially since Yamazaki teaches depositing the silicon nitride films on semiconductor substrates (Col. 1, lines 15-20).

Thus, claims 6 and 15 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Yamazaki, Inayoshi, and Aoyama.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELIZABETH A. BURKHART whose telephone number is (571)272-6647. The examiner can normally be reached on M-Th 7-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Elizabeth A Burkhart/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792